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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

KITOV, ZEEV

ART UNIT PAPER NUMBER

2836

DATE MAILED: 07/17/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/724,948

Applicant(s)

BEHIN ET AL.

Examiner

Zeev Kitov

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 22 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 - 22 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6, 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. New formal drawings are required in this application because submitted drawings are not in compliance with USPTO standards. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The spacing of the lines of the specification is such as to make reading and entry of amendments difficult. New application papers with lines double spaced on good quality paper are required.

Claim Rejections - 35 USC § 112

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

3. Claim 19 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. According to the claim language, "the clamping voltage and a sensing signal are alternatively applied in time" to the electrodes. Temporary termination of the clamping voltage would result in unstable positioning of

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the mirror. That contradicts a stated goal of the application, namely providing the micro-mirror with two stable states. Therefore, an examiner believes that an applicant omitted an essential element in the claim, namely retaining a holding value of an electrode voltage at the time when an attracting voltage is terminated and a sensing signal is applied.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 – 18, 19 - 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Little et al., US Patent 6,396,976 in a view of Netzer et al., European Patent Publication 0,683,414. Little et al. discloses a rotating element (element 12 in Fig. 3a) including a first electrode (element 40 in Fig. 3a) and a second electrode (element 42 in Fig. 3a). But he does not disclose means for measuring a capacitance between them and means for determining from the capacitance a control state of the device. Netzer et al. discloses the means for measuring the capacitance between electrodes (elements 150 and 152 in Fig. 8 and col.8, lines 28 - 58) for determining a position of a microactuator. His results were presented in a way suitable for digital interpretation. Both patents have the same problem solving area, namely providing electrostatically activated optical switches. Therefore, it would have been obvious to one

of ordinary skill in the art at the time the invention was made to have used the capacitive position sensing method of Netzer et al. in the array of micromachined mirrors of Little, because using an active control system that utilizes feedback allows to reduce an energy consumption.

Regarding Claim 2, Netzer et al. discloses means for determining a deviation from a desired control state (Fig. 8 and col. 8, lines 28 – 58).

Regarding Claim 3, Little et al. discloses the device having two control states (col. 4, lines 50 – 67, col. 5).

Regarding Claim 4, Little et al. discloses a means for rotating the rotatable element (see Abstract).

Regarding Claim 5, Little et al. discloses a MEMS mirror (see Abstract).

Regarding Claim 6, Little et al. discloses an element configured to rotate between two angular positions (element 12 in Fig. 3a), one or more electrodes disposed proximate the element (elements 40 and 42 in Fig. 3a), wherein a capacitance between the element and the electrode has a first value when the element is in a first control state and the capacitance has a second value when the element is in a second control state. It is obvious to one of ordinary skill in the art, that moving the element closer to the electrode would reduce a distance between two plates of a capacitor and therefore would increase a capacitance between them. Netzer et al. discloses the means for measuring a value of the capacitance between the element and one of the electrodes and the means coupled to the capacitance sensing means for determining a control state of the element from the value of the capacitance (Fig. 5, 6, 9 and 11).

Regarding Claim 7, Little et al. discloses the device having the first and second angular positions 90^0 apart (col. 4, lines 39 – 48).

Regarding Claims 8, 9 and 10, Little et al. discloses the means for actuating the element (elements 52, 54, 56 and 50 in Fig. 4a).

Regarding Claim 11, Little et al. discloses the device having the element connected to the substrate by a hinge (element 43 in Fig. 3a, and col. 4, lines 50 – 60).

Regarding Claim 12, Netzer et al. discloses the electrode disposed on the substrate proximate the element (element 150 is attached to the substrate, col. 8, lines 28 – 34).

Regarding Claim 13, Little et al. discloses a vertical stop disposed proximate the element (col. 2, lines 51 – 53).

Regarding Claim 14, Little et al. discloses the one or more electrodes attached to the vertical stop (elements 40 and 42 in Fig. 3a and 3b).

Regarding Claim 15, Little et al. discloses the device having a MEMS mirror (see an Abstract).

Regarding Claim 16, all the elements of the claim have been discussed in the Claim 1 rejection; as to the claimed method, it is inherent in the structure of the device.

Regarding Claim 17, Little et al. discloses applying the electrostatic clamping voltage to one or more of the first and second electrodes (see Abstract).

Regarding Claim 18, Little et al. and Netzer et al. disclose all the elements of the claim. Little et al. discloses application of DC attracting (holding) voltage (col. 2, lines 56 – 64). Netzer et al. discloses an application of a high frequency sensing signal to the

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plates (col. 8, lines 40 – 43). Since the signals are applied to the same electrodes they are being superimposed.

Regarding Claim 20, Netzer et al. discloses a position sensing circuit participating in a feedback control loop controlling affecting a position control circuitry (Fig. 7). It would be obvious to one of ordinary skill in the art at the time the invention was made to have used the capacitance sensing means for determining the presence of a fault in the device, if the device failed to reach a target value of the capacitance at predetermined time, because it is common in the art of manufacturing of IC's and MEMS to use any possible means for testing the product at the time of manufacturing.

Regarding Claim 21, Netzer et al. discloses using the value of the capacitance to time the actuation of the element. Fig. 7 shows an element 122, a position control circuitry, generating driving currents through coils 24 and 26 upon values of signals V24, V26 received from an element 124, a capacitive position sensor (col. 7, lines 42 – 58, col. 8, lines 1 – 9).

Regarding Claim 22, Little et al. and Netzer et al. disclose all the elements of the claim. Little et al. discloses one or more input fibers (elements 16 in Fig. 1a), one or more output fibers (elements 18 in Fig. 1a), a micromechanical system optical switch (see Abstract), one or more MEMS mirrors (elements 12 in Fig. 1a) configured to rotate between a first angular position and a second angular position (element 12 in Fig. 3a), one or more electrodes disposed proximate each of the one or more mirrors (elements 40 and 42 in Fig. 3a). Netzer et al. discloses a capacitance between the mirrors and the electrodes having a first value when the mirrors are in a first control state and the

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capacitance having a second value when the element is in a second control state (col. 8, lines 28 – 58), means for measuring a value of the capacitance between at least one or more mirrors and at least on or more electrodes (elements 150, 152, 154, 156 and 158 in Fig. 8) and means coupled to the capacitance sensing means for determining a control state of the element from the value of the capacitance (elements 124, 24, 26 and 122 in Fig. 7).

Conclusion

The prior art made of record not relied upon is considered pertinent to applicant's disclosure.

- US Patent 5,960,132 – Fiber-optic free space micromachined matrix switches – Lin,
- US Patent 5,302,886 – Mechanical/electrical displacement transducer – Jacobsen et al.,
- US Patent 4,935,700 – Fringe field capacitive sensor for measuring the size of an opening – Garbini et al.,
- US Patent 5,996,848 – Micromachined electrostatic vertical actuator – Lee et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zeev Kitov whose telephone number is (703)

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305-0759. The examiner can normally be reached on 8:00 – 4:30. If attempts to reach examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (703) 308-3119. The fax phone numbers for organization where this application or proceedings is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Z.K.
7/8/02



BRIAN SIRCUS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

6/18/01

The below text replaces the pre-printed text under the heading, "Information on How to Effect Drawing Changes," on the back of the PTO-948 (Rev. 03/01, or earlier) form.

INFORMATION ON HOW TO EFFECT DRAWING CHANGES

1. Correction of Informalities -- 37 CFR 1.85

New corrected drawings must be filed with the changes incorporated therein. Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin. If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the Notice of Allowability. Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136(a) or (b) for filing the corrected drawings after the mailing of a Notice of Allowability. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

2. Corrections other than Informalities Noted by Draftsperson on form PTO-948.

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

Timing of Corrections

Applicant is required to submit the drawing corrections within the time period set in the attached Office communication. See 37 CFR 1.85(a).

Failure to take corrective action within the set period will result in **ABANDONMENT** of the application.